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DRAWINGS ATTACHED

1 292 246

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(54) IMPROVEMENTS IN LOCKS

(71) We, EWALD WITTE & Co., a German Kommanditgesellschaft, of 562 Velbert, Hoferstr. 5, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

One kind of lock, particularly for the hinged doors of motor vehicles, has a forked latch member which rotates about an axis substantially perpendicular to the pivotal axis about which the door can be opened and closed, the latch member having teeth which in cooperation with a lever spring loaded into engagement with the latch member, define partially and fully closed positions of the latch member and therefore of the door, such as a car door, to which the lock is fitted. Such locks have an external operating member, such as a handle, lever or push-button, and usually an internal operating member as well, so that the door can be opened from inside the car, for example.

In known locks of this general kind for motor vehicles, there is a lock plate bent to form an angle, the lock plate supporting the flange wall of the axle stud of the externally mounted forked catch member. A locking wheel with its locking latch is situated on the inner side of the flange, the remaining part of the lock mechanism, for example devices for opening the lock and for locking it, being mounted on the angled lock base plate. This arrangement makes it difficult to coordinate the mechanical parts of the lock and makes it necessary to superpose the parts over each other. Intermediate levers are necessary and extra bearings. Furthermore the levers and sliders require a considerable space to allow them the necessary freedom of movement. The lock is consequently comparatively large and the costs of manufacture are high, not only for materials but also because assembly requires time consuming precision.

According to the present invention, a lock of the kind described includes a shaft which is rotatable between operative and inoperative positions and which is axially movable, by means of an external operating member, against spring action from a rest position, the shaft having a driver which is arranged to disengage the lever from the latch member upon axial movement of the shaft from its rest position with the shaft rotated into its operative position but which is clear of the lever when the shaft is rotated into its inoperative position. This arrangement provides a simple and compact lock with fewer intermediate levers and fewer bearings than have previously been necessary.

The shaft is usually arranged to be rotated by means of a key cooperating with a lock cylinder.

Preferably the shaft has a radially projecting pin cooperating with a sliding plate which is coupled to the lever, the arrangement being such that, if the catch member is moved to its fully closed position when the shaft is rotated to its inoperative position and is axially in its rest position, the plate engages the pin to rotate the shaft to its operative position.

Further advantages are obtained if the shaft has a radially projecting toothed driver which engages a toothed rocker coupled to an internal operating member such as a lever or push-button.

The toothed rocker preferably occupies a plane perpendicular to the axis of the shaft and has a cam surface adjacent to the lever and arranged to disengage the lever from the latch member upon rotation of the rocker.

The mechanical parts of the lock may be housed in recesses in a lock body made of a synthetic resin material and it is convenient for the axis of the shaft to be parallel to the plane of the lever.

One example of a lock according to the invention is shown in the accompanying drawings, in which:—

Figure 1 is a partly sectioned plan view through a motor vehicle door, with a door

lock according to the invention attached to the edge of the door;

Figure 2 is a front view of the lock, with a front cover plate removed;

Figure 3 is a section taken along the line III—III in Figure 2;

Figure 4 is a section taken along the line IV—IV in Figure 2;

Figure 5 is a side view of the door lock, showing an internal actuator rod in a locking position; and,

Figure 6 is a corresponding side view, but showing the internal actuator rod in an unlocked position.

A door grip 2 is attached to the outer wall 1 of a hollow motor vehicle door and contains a lock cylinder 4 operated by a key 3. An operator's lever is shown at 5. The operator's lever 5 has a thrust stud 6 which acts on an angled arm 7 of an actuating fork 8 fixed to the end of a lock shaft 9. The key 3, acting through the lock cylinder 4, actuates a crank pin 10, which moves on a circular path through an angle of approximately 90°, the crank pin 10 working in the mouth of the actuating fork 8 so that movement of the crank pin 10 on its circular path rotates the actuating fork 8 and the lock shaft 9.

A lock body 13, fixed to the door edge 12 closing against a door post 11, is in the form of a block of synthetic resin material containing recesses to accommodate the mechanical parts of the lock. The lock body 13 is closed at the front by a front cover plate 14, which has a latch-slot 15 into which engages, when the door is closed, a post-stud 16 secured to the door post 11.

The lock body 13 is mounted on the door edge 12 so that the lock shaft 9 is at the height of the lock cylinder 4 and so that the crank pin 10 engages in the mouth of the actuating fork 8. The thrust stud of the operator's lever 5 is in position to act on the angled arm 7 of the actuating fork 8.

Projecting into the interior of the door from the lock body 13 there is a projecting bracket 17 which passes through the door-folding wall 12. Pivoted in a bearing on the projecting bracket 17 there is an actuating rocker 18 to which is attached an internal actuator rod 19.

The lock body 13 contains a forked latch-bolt 20 which rotates in a plane parallel to the edge 12. The forked latch-bolt 20 has a mouth 21 and, opposite this, locking teeth 22. The forked latch-bolt 20 can adopt two locked positions, determined by the locking teeth 22, a preliminary or partially locked position and a fully locked position. The forked latch-bolt 20 rotates on a central pin 23, and is spring loaded by a tension spring 24 which tends to rotate the forked latch-bolt anticlockwise into its open position, ready to receive the post-stud 16. The lock body 13 also contains an L-shaped detent lever 25 which has a vertical arm 25^{11} and a horizontal arm 25^{1}, the latter equipped with teeth which engage with the locking teeth 22 of the forked latch-bolt 20. The tension spring 24 is anchored at one end to the forked latch-bolt 20 and at the other end to the horizontal arm 25^{1} of the L-shaped detent lever 25, so that the teeth are pulled by the tension spring 24 into engagement with each other.

The lock shaft 9 slides back and forth, towards and away from the vertical arm 25^{11} of the L-shaped detent lever 25, the lock shaft 9 sliding in guiding channels in the lock body 13, spring loaded by a compression spring 26 which pushes the lock shaft 9 towards the left, away from the vertical arm 25^{11}. The compression spring 26 takes support at one end against the end of the lock shaft 9 and, at its other end, against an inner surface of the lock body 13.

The lock shaft 9 has a radially projecting pin 27 which cooperates with a sliding plate 28 pivoted to the horizontal arm 25^{1} of the L-shaped detent lever 25, the sliding plate 28 sliding, tagential to the surface of the lock shaft 9, in a recess in the lock body 13. The sliding plate 28 has a stepped edge 28^{1} arranged so that the sliding plate 28 is free to slide upwards when the lock shaft 9 has been pushed inwards into the lock body.

Near its inner end the lock shaft 9 has a radially projecting toothed driver 29 which engages with a toothed rocker part 30 so that when the lock shaft 9 rotates, the toothed rocker part 30 rotates in the opposite direction. The toothed rocker part 30 has a cam projection 31 whose cam surface comes into position in front of the vertical arm 25^{11} when toothed rocker part 30 is rotated.

Projecting inwards from the vertical arm 25^{11} into the path of movement of the lock shaft 9 there is a pin 25^{111} which cooperates with a driver 32 on the lock shaft 9. The driver 32 is positioned at an angle relative to the radial pin 27.

The door lock described above functions as follows:

Assuming that the door is initially open and is then slammed shut, the post-stud 16 enters the catch-slot 15, engaging in the mouth 21 of the forked latch-bolt 20 and rotating the latter clockwise. During this movement the L-shaped detent lever 25 engages, first into a preliminary locked position and finally into a fully locked position as shown in Figure 2.

If the operator now opens the door, the lock functions as follows. When the operator actuates the lever 5, the thrust stud 6 thrusts the angled arm 7 inwards, towards the right, thrusting the angled arm 7 inwards, towards the right, thrusting the lock shaft 9 inwards into the lock body. The actuating fork 8 is

assumed to be in the unlocked position, as shown in Figure 6. During the inward movement of the lock shaft 9 the driver 32 thrusts the pin 25^{111}, rocking the vertical arm 25^{11} clockwise and lifting the teeth of the horizontal arm 25^{1}, releasing the forked latch-bolt 20, with the result that the forked catch plate rotates anticlockwise into its open position, pulled by the tension spring 24. This allows the door to be opened.

On the other hand assuming that the door is initially in the closed position, the operator can lock the door as follows. Using the key 3 the operator rotates the lock cylinder 4 clockwise, the crank pin 10 rotating the actuating fork 8 from the position shown in Figure 6 into the position shown in Figure 5. This brings the radial pin 27 in a locking position in the path of the sliding plate 28 and moves the driver 32 into an inoperative position in which it cannot thrust against the pin 25^{111}. The door is locked. It should be observed that if the operator locks the door, using the key, while the door is open and then slams the door shut with the lever 5 retracted, the detent lever 25 can still pivot, allowing the latch-bolt 20 to rotate into the locked position. This also locks the door.

Assuming that the parts are in the position the positions shown in Figure 5, when the operator depresses the internal push-button the internal actuator rod 19 rotates the toothed rocker part 30 clockwise into the position shown in Figure 6. In this movement the cam projection 31 thrusts the vertical arm 25^{11} clockwise, disengaging the detent lever 25 and allowing the forked latch-bolt 20 to rotate anticlockwise into its open position.

Assuming that the parts are in the position shown in Figure 6, the operator can lock the lock by means of the internal push-button as follows. Operation of the push-button rotates the lock shaft 9 into the locked position shown in Figure 5. This locks the vehicle door so that it cannot be opened from the outside without first rotating the actuating fork 8 into its open position (Figure 6) by means of the key.

If it is assumed that the door is initially open with its lock in the locked position and is then slammed shut, the lock responds as follows. During the slamming of the door the sliding plate 28 is lifted, sliding upwards and rotating the lock shaft 9 backwards. This rotates the actuating fork 8 back into the position shown in Figure 6, in which the lock is in the unlocked state.

The lock according to the invention is constructed in such a way that it can without resulting disadvantages be mounted on the front face of the door, giving better accessibility for repairs or for replacing the lock.

WHAT WE CLAIM IS:—

1. A lock comprising a rotatable forked latch member having teeth which, in cooperation with a lever spring-loaded into engagement with the latch member, define partially and fully closed positions of the latch member and therefore, in use, of a door to which the lock may be fitted, a shaft which is rotatable between operative and inoperative positions and which is axially movable, by means of an external operating member, against spring action from a rest position, the shaft having a driver which is arranged to disengage the lever from the latch member upon axial movement of the shaft from its rest position with the shaft rotated into its operative position but which is clear of the lever when the shaft is rotated into its inoperative position.

2. A lock according to claim 1, in which the shaft has a radially projecting pin cooperating with a sliding plate which is coupled to the lever, the arrangement being such that, if the latch member is moved to its fully closed position when the shaft is rotated to its inoperative position and is axially in its rest position, the plate engages the pin to rotate the shaft to its operative position.

3. A lock according to claim 1 or claim 2, in which the shaft has a radially projecting toothed driver which engages a toothed rocker coupled to an internal operating member.

4. A lock according to claim 3, in which the toothed rocker occupies a plane perpendicular to the axis of the shaft and has a cam surface adjacent to the lever and arranged to disengage the lever from the latch member upon rotation of the rocker.

5. A lock according to any one of the preceding claims, in which mechanical parts of the lock are housed in recesses in a lock body which is made of a synthetic resin material.

6. A lock according to any one of the preceding claims, in which the axis of the shaft is parallel to the plane of the lever.

7. A lock according to claim 2, in which the driver and the radial pin of the shaft are angularly offset about the shaft axis.

8. A lock according to claim 1, substantially as described with reference to the accompanying drawings.

9. A motor vehicle having a hinged door fitted with a lock according to any one of the preceding claims.

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3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig. 1

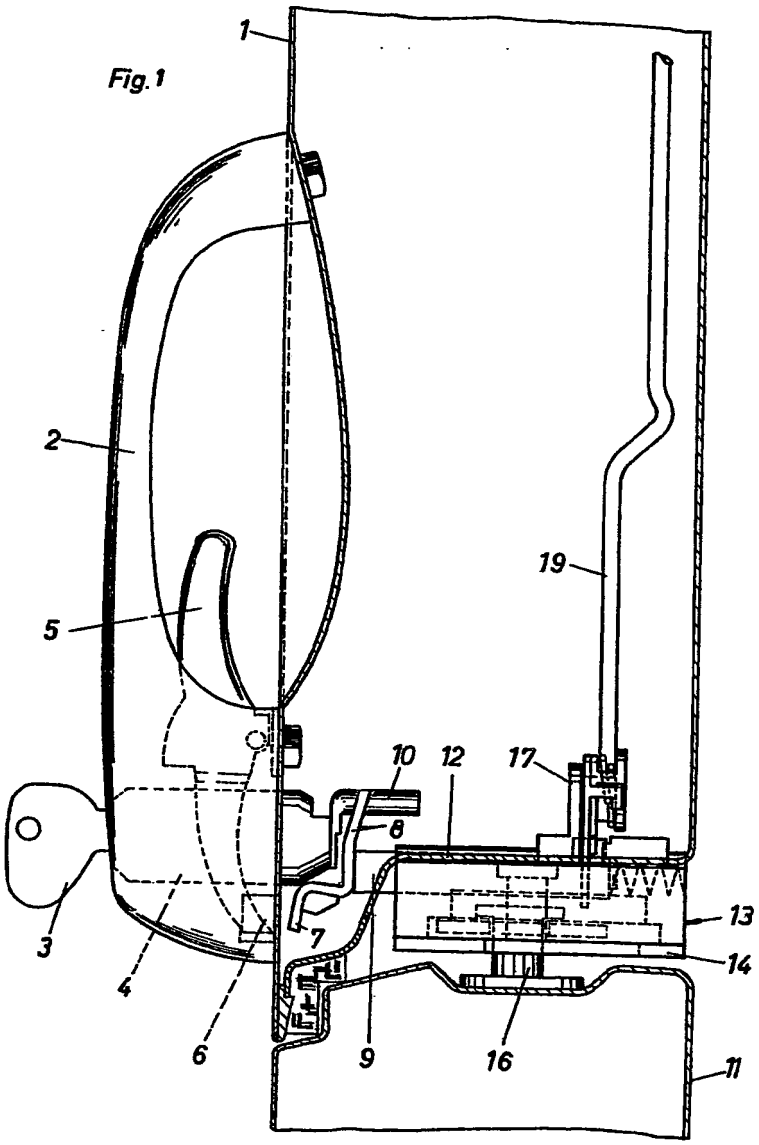

Fig.2

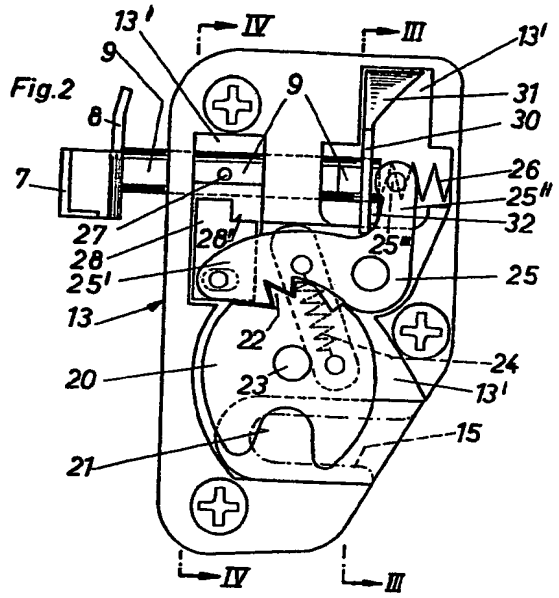

Fig.3

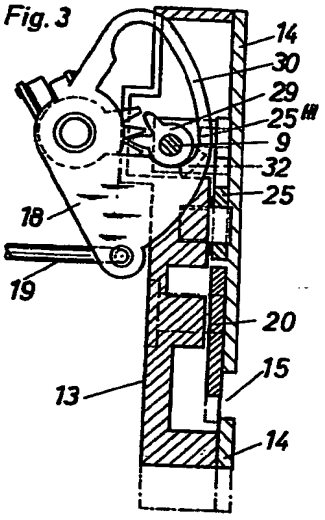

Fig.4

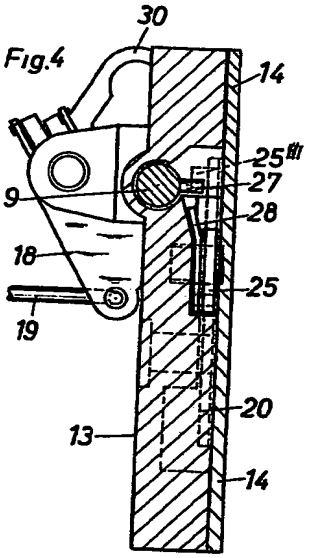

Fig. 5

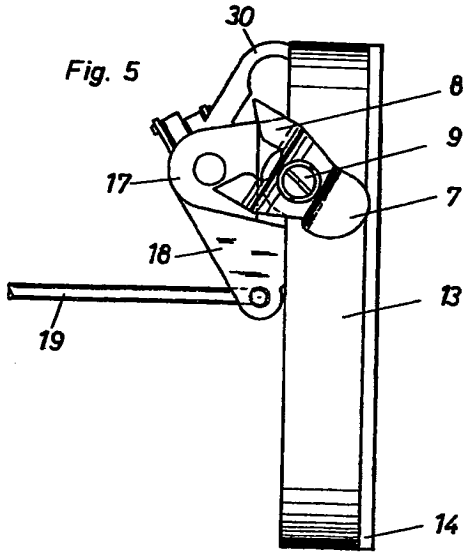

Fig. 6